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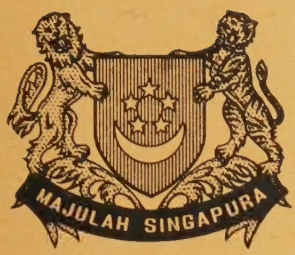
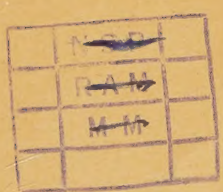


STATE OF SINGAPORE

ANNUAL REPORT OF THE BOTANIC GARDENS DEPARTMENT FOR 1959



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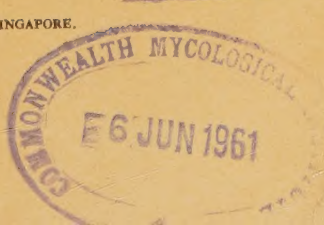

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ADMINISTRATION

I. GENERAL

FROM THE BEGINNING of the year till 31st May the Department was under the former Chief Secretary's Ministry. From 3rd June onwards it came under the newly-formed Ministry of National Development.

II. CENTENARY OF THE GARDENS

2. The most notable event of the year was the centenary of the founding of the Gardens. An agri-horticultural association, with official assistance, took possession of most of the land which is now the Gardens near the end of 1859. Its purpose was to provide a pleasure garden for its members and to introduce and acclimatise plants of possible economic value and to foster the growing agricultural and horticultural interests of the young settlement of Singapore. Financial difficulties beset the Society, and from its inception it was never without direct or indirect Government assistance. Eventually in 1874 Government accepted the entire liability for running the Gardens as a public department. From this time its function broadened; a horticultural officer with taxonomic experience was appointed Superintendent and the Department was charged with a duty of studying the flora of the Malay Peninsula. The priority of botanical research over horticulture was further emphasised in 1888 when a trained botanist became its first Director, the title of Superintendent being dropped.

3. In 1882 a Department of Forests was created in the Straits Settlements under the direction of the officers of the Botanic Gardens. In 1896 the Director of Gardens advised on the establishment of a Forest Department in Selangor and recommended the formation of a Forest Department in the Federated Malay States (Perak, Selangor, Negri Sembilan and Pahang). After further investigation by an officer of the Indian Forest Service an unified Straits Settlements-Federated Malay States forest service was created as a self-contained department in 1901.

4. Similar growth took place in the agricultural field and a Department of Agriculture in the Federated Malay States was set up in 1905. Up to this time the Gardens had been the only source of information on economic crops. From 1891 to 1900 the Gardens published *The Agricultural Bulletin of the Malay Peninsula,* and from 1901 to 1912 *The Agricultural Bulletin of the Straits and Federated Malay States.* Though the title of these periodicals suggested material of agricultural significance, their contents were in fact varied and covered agriculture, forestry, horticulture and many related sciences.

5. From 1913 onwards the Gardens has published its research work in *The Gardens' Bulletin* and in a number of separate books. With the strengthening of the work on agriculture and forestry in Malaya by the formation of specialised departments, the Botanic Gardens concentrated on taxonomic botany and ecology, which are basic problems to land utilisation and economic exploitation of natural plant resources, and on horticulture.

6. The occasion of the centenary was marked by the issue of a special number of the *Gardens' Bulletin,* Vol. 17, pt. 2.

III. STAFF

7. Mr. G. H. Addison, Curator, ceased duty on 1st March and retired on 12th June under the terms of Government's Malayanisation policy. Mr. Addison had served the Department for over 22 years. Mr. J. L. Pestana, Laboratory Assistant (Special Grade), retired on 31st July after 31¾ years' service. The post of Assistant Director, vacant since January 1958, was advertised but no appointment was made. However it is possible to report some slight improvement on the very difficult staff position recorded in the previous two years' reports. It was decided to regrade the post of Assistant Director as Botanist and Miss Chang Kiaw Lan, a Botany Honours graduate of the University of Malaya, was appointed on 7th July. One officer was away on overseas training throughout the year but three others completed their training during the year and resumed duty. These absences threw extra responsibilities on the staff members remaining on duty at Singapore. The services of Dr. Furtado, a Botanic Gardens pensioner, were retained as a training replacement officer in the post of Botanist.

8. Mr. Sinclair was on overseas leave from 1st April to 13th October and the Director on short overseas leave from 16th December for the rest of the year.

9. The decision to regrade the post of Assistant Director was taken after failure to fill the appointment. At the same time it was decided to designate the post of Keeper of the Herbarium as "Botanist (Keeper of the Herbarium)." The posts of Assistant Director, Keeper of the Herbarium and Botanist are all on the same salary scale in the Botanical Research Division of the Department and grading them all as Botanist will simplify the allocation of duties and obviate certain establishment procedures in filling the posts.

IV. TRAINING

10. Under Government's policy of training personnel the following officers were on courses of study overseas:

(i) Mr. Chew Wee Lek, Botanist, continued to study for a post graduate degree at Cambridge University under Mr. E. J. H. Corner, who was at one time Assistant Director of this Department.

(ii) Mr. Lam Hin Cheng, Horticultural Assistant, successfully completed a two-year course of study at the Royal Botanic Gardens, Kew, for the Kew Diploma. He returned to duty at Singapore on 10th October.

(iii) Mr. Bajuri bin Sappan, Laboratory Assistant, successfully completed an eleven-month course of instruction in plant breeding and propagation at various institutions in England and returned to duty at Singapore on 3rd January.

(iv) Mr. Tan Kim Ho, Librarian, went to Australia on 20th February on a fellowship awarded by the Australian Government under the Colombo Aid Plan to study Library Management. He studied at various libraries under arrangements made by the Commonwealth Scientific and Industrial Research Organisation, and returned to duty at Singapore on 26th November.

V. LABOUR

11. The labour force averaged 70 men, women and juveniles in the Botanic Gardens, 4 in the herbarium, 55 in the Istana Negara (Government House) Domain and 8 in the Nature Reserves.

VI. BUILDINGS AND ROADS

12. Gardens resources undertook the following works:

(i) The water tank in the Plant House was completed early in the year.

(ii) The manure shed on Lawn U was enclosed with very fine mesh wire netting as a precaution against flies.

(iii) A new nursery on Lawn Z below the Curator's (Assistant Director's) bungalow was enclosed with a wire netting fence.

(iv) A number of seats was constructed using surplus perforated steel plate from the old Kallang Airport. These were placed on Lawns F and E.

(v) The fernery at the Potting Yard, which had become very dilapidated, was pulled down and reconstruction was begun.

(vi) Repairs to many drains were carried out, some on roadsides requiring complete regrading and relaying of their brick sides.

(vii) Construction of a slatted roof house in the Orchid Nursery (Lawn T) for the orchid species.

(viii) Erection of a 40 ft. metal tower was begun. This is intended to carry meteorological instruments, which will then be free of shading from trees. The tower will also carry a small water tank to give a head of water for a mist propagation unit which will be constructed nearby.

13. In April very extensive cracking appeared in the lower walls of the herbarium built in 1901, and in the buttresses built to carry the weight of the upper floor which was added in 1930. The P.W.D. has carried out an inspection and will undertake any repairs considered necessary.

14. The condition of the roads remained good and no repairing was necessary.

VII. VISITORS

15. Many official visitors called at the office including:

Nai Kasin Suvatabandhu, Department of Agriculture, Thailand.
Professor P. R. Richards, University College of North Wales, Bangor.
Lord Faringdon, Buscot Park, Berkshire, England.
Prof. D. P. Watson, Michigan State University, U.S.A.
Prof. J. H. Davis, University of Florida, U.S.A.
Mr. and Mrs. R. D. Pope, Proprietors of Cypress Gardens, Florida, U.S.A.
Mr. L. Mattsson, Director U.N.E.S.C.O. Science Co-operation Office, Djakarta.
Dr. P. O. Wiehe, Director, Sugar Research Institute, Mauritius.
Dr. W. S. Stewart, Director, Los Angeles State and County Arboretum, California, U.S.A.
Prof. M. E. Poore, Department of Botany, University of Malaya, Kuala Lumpur.
Prof. G. M. Davis, Department of Agriculture, University of Malaya, Kuala Lumpur.
Dr. Kamemoto, Head, Department of Horticulture, University of Hawaii.
Dr. R. A. Hamilton, Professor of Agriculture, University of Hawaii.
Dr. Kusnoto Setyodiwiryo, Director, Kebun Raya, Bogor, Indonesia.
Dr. W. H. Hodge, Department of Education and Research, Longwood Gardens, Pennsylvania, U.S.A.
Dr. K. A. Chowdhury, Department of Botany, Aligarh University, India.
Mr. and Mrs. Rod McLellan, Orchid Nursery Proprietors, San Francisco, U.S.A.
Mr. R. O. Williams, Asst. Director of Agriculture (Research), Sarawak.
Mr. Tatsuro Matsuda, Faculty of Sciences, Tohoku University, Japan.

These visits afforded occasion for useful and interesting discussions.

16. Many visiting research workers were afforded facilities for studying in the herbarium and gardens:

Dr. Paul Surani, Entomologist, South Pacific Commission, Noumea. Coconut weevil.

Mr. A. Santiago, Botanist, Department of Agriculture, Kuala Lumpur. *Citrus.*

Mr. R. W. Paine, Entomologist, Department of Agriculture, Fiji. Banana Scabmoth (*Nacoleia*) project.

Mr. M. B. Spurling, Horticultural Research Officer, Department of Agriculture, South Australia. *Citrus* breeding.

Dr. A. J. G. H. Kostermans, Professor of Botany, University of Bandung, and Inspector of Forests, Forest Research Institute, Bogor. *Lauraceæ* and forest trees.

Prof. E. C. Abbe, Department of Botany, University of Minnesota, U.S.A. *Fagaceæ.*

Prof. F. Fagerlind, Department of Botany, University of Lund, Sweden. *Selaginella.*

17. The facilities of the Department were made freely available to members of the staff and to sponsored students of the University of Malaya.

18. The Gardens attracted an even greater number of casual visitors coming on their own or in organised parties. Travel agencies seem to be making greater use of the Gardens to bring tourists and many busloads are brought to the gates to be walked through the Gardens. On occasions when prior notice had been given special traffic arrangements were made for taxis to bring in elderly visitors.

VIII. CONCERTS

19. Twenty-one band performances were given in the Gardens, two by the band of the 1 Loyal Regiment and the rest by the band of the Singapore Police Force. Their respective band masters, the Commanding Officer of the 1 Loyal Regiment, the G.O.C., Singapore Base District and the Commissioner of Police, Singapore, are thanked for their courtesy in permitting their bands to play.

20. Five variety shows (the Aneka Ragam Ra'ayat) were staged in the Botanic Gardens under arrangements made by the Ministry of Culture. The first one held on 2nd August was declared open by Mr. Lee Kuan Yew, Prime Minister, before a crowd estimated to be 20,000 persons. Another was held after dark and the section of the Gardens around the Lake was floodlit.

IX. PUBLICATIONS

21. Part 2 of *Gardens' Bulletin* 17 was issued on 5th December as a special number to mark the occasion of the Gardens' centenary. Contributions were received by invitation from guest writers whose work, or the work of the institutions they represented, had a bearing on the work of the Botanic Gardens. Thus 17 authors presented articles of topical significance, which were not only retrospective but prospective and indicative of the rôle of Botanic Gardens in modern society. A further nine papers on subjects of original research were also presented.

22. During the year papers by members of the Department were published:

BURKILL, H. M.: The Botanic Gardens and Conservation in Malaya *Gard. Bull. Sing.* 17 (2) 1959. The Botanic Gardens, Singapore, 1859-1959 *Nature* 184, 1602-1604, 1959. A survey of Nature Conservation on Singapore Island *Proc. 9th Pac. Sci. Cong.*, 7, 1959. Large Scale Variety Trials of Hevea Brasiliensis Muell.-Arg. on Malayan Estates, 1934-53. *J. Rubb. Res. Inst. Malaya* 16, 1959.

FURTADO, C. X.: Singapore's Contribution to the Study of Palms, *Gard. Bull. Sing.* 17 (2) 1959. A New Aroid from Sarawak *ibid*, 1959. Some New or Noteworthy Species of Malaysia, *ibid*, 1959.

23. Five new parts of the series "Malayan Garden Plants" were published: No. 7, Ten Flowering Shrubs (second decade); No. 8, Ten Flowering Climbers; No. 9, Ten Flowering Bulbs; No. 10, Ten Hedge Plants; and No. 11, Ten Succulents. Departmental publications produced a revenue of $6,702.33, including those sold through the Government Publications Bureau.

X. LIBRARY

24. The accommodation of the library remains unchanged, the books being stored in two separate rooms, neither of which was designed for this function, and both badly needed for their intended purpose. One is an office room, the other is an extension of the herbarium in which the spirit collection of plants should be stored. The spirit collection remains in the herbarium and is an embarrassing fire hazard. The lack of proper library accommodation is most unsatisfactory and it impedes the normal functioning of the library and holds up other work.

25. Library accessions amounted to 295 volumes, of which 258 were periodicals received on reciprocal exchange. This large intake of material adds to the difficulty of improper and inadequate accommodation.

26. A large amount of binding was carried out during the year. Two hundred and twenty-one volumes were bound, three quarters by the Prisons Department, the rest by the Government Printer.

XI. AGRICULTURAL PESTS SUPERVISORY COMMITTEE

27. Mr. Burkill, Director, was a member of the Committee.

XII. IMPERIAL WAR GRAVES COMMISSION CEMETERY KRANJI

28. The Botanic Gardens continued to supervise the horticultural work of the Cemetery under instructions from the Imperial War Graves Commission Regional Headquarters in New Delhi. The Chief Horticultural Officer and two Regional Horticultural Officers of the Commission visited Singapore in January and discussions were held with them regarding maintenance of the Cemetery. Funds for personnel and materials for this work were provided by the Commission in whose reports fuller detail may be found.

29. The highlight of the year was the visit on 22nd February of H.R.H. The Duke of Edinburgh. The Director had the honour of conducting His Royal Highness and His Excellency, Sir William Goode, then Governor of Singapore, round the Cemetery.

30. The number of visitors to the Cemetery during the year is estimated at about 14,500.

XIII. NATURE RESERVES

31. The Board of Trustees consisted of:

Nominated by the Governor-in-Council (Yang di-Pertuan Negara as from 3rd June, 1959)	1. Mr. E. Galistan	Retired 26-6-59.
	2. Mr. Morgan Khoo Kay Ann.	
Nominated by the Minister ...	3. Mr. Tan Hoon Siang.	
	4. Prof. H. B. Gilliland.	
Nominated by the City Council	5. Mr. Chan Chee Seng ...	Retired 5-6-59.
	Mr. Tan Jake Hooi ...	From 1-10-59.
Nominated by the Rural Board	6. Mr. R. S. Boswell ...	Retired 4-7-59.
	Mr. Chan Chiaw Thor ...	From 1-10-59.
Chairman ex-officio ...	7. Director of Botanic Gardens.	

32. No major matter arose during the year and normal maintenance and development was possible. The foot-paths at Bukit Timah and the perimeter path at the Kranji Reserve were upkept. Additional notice boards drawing the attention of the public to the existence of the Reserves were put up at Labrador, Ulu Pandan and Bukit Timah. A further 50 notice boards were supplied to the Water Department for placing around the Water Catchment Area.

33. The P.W.D. request for an exchange of 1.8 acres of rocky land for a similar piece adjoining in order to improve their facilities for extracting rock at their quarry at the north end of Bukit Timah was approved, and the two pieces of land were realienated.

34. A temporary boathouse was put up at the Ulu Pandan Reserve where the Board's boat could be kept and locked against theft.

35. The main matter of import in the Water Catchment Area was an application by the military authorities for an increase in range facilities for small arms firing. The Chief Engineer of the British Army and the Director made two aerial surveys of the Water Catchment Area and the off-lying islands and covered on foot areas of the Water Catchment Area which appeared to be possible locations. Eventually the sitting of ranges with the extent of target space required was agreed upon without enlarging the danger area of the existing ranges and without involving the destruction of certain areas of swamp forest vegetation unique on Singapore Island. The military proposal with the concurrence of the Water Department and the Nature Reserves Board were put up for Government approval at the end of the year.

36. The Nature Reserves Board held two meetings during the year.

XIV. METEOROLOGICAL

37. Observations were continued at the meteorological stations at the office and in the orchid enclosure. Records are tabulated in the Appendices II and III. In all recorded respects the year was near average.

38. In recording the hours of sunshine a critical defect was observed in shade cast by trees in the early morning and late evening. Comparison with sunshine data recorded by the Meteorological Department at the station at Paya Lebar Airport indicated that our records were short by about 1½ hours daily. Because of this, sunshine data is not given in this report and previously published figures should be viewed with caution.

39. To avoid such shading a tower is being erected so that instruments will be placed beyond extraneous interference. It will also be used for obtaining other data which may have a bearing on plant physiology.

BOTANICAL RESEARCH

XV. COLLECTING AND NEW RECORDS

40. Many single day collecting trips were made into the Nature Reserves and countryside on Singapore Island and into the forests and countryside of South Johore. These yielded much useful and valuable material, but the bulk of the collecting work was done on the following expeditions:

J. Sinclair	West Java	21/2–3/3	96 nos.
J. Sinclair	Ceylon (while proceeding to Europe on leave)	5–6/4	36 nos.
Mohd. Shah bin Haji Md. Nur and Kadim bin Tassim	Kerilla Estate, Temangan, Kelantan	28/2–9/3	132 nos.
Kadim bin Tassim and Mahmud bin Awang ...	Sungei Mai Estate, Pahang ...	26/3–1/4	113 nos.
H. M. Burkill, Kadim bin Tassim and Md. Noor bin Jumaat	Kuala Sedili New Road, Johore ...	21–29/6	194 nos.
H. M. Burkill, Kadim bin Tassim and Md. Noor bin Jumaat	Endau Development Project, Johore	13–24/7	205 nos.
Mrs. B. E. Allen and Kadim bin Tassim ...	Ipoh District, Perak	9–17/8	75 nos.
H. M. Burkill, Md. Shah bin Hj. Md. Nur and Md. Noor bin Jumaat ...	Fraser's Hill, Pahang/Selangor boundary	24–30/8	298 nos.
H. M. Burkill, Md. Shah bin Hj. Md. Nur and Md. Noor bin Jumaat ...	Kuala Sedili New Road, Johore ...	21–28/9	118 nos.
A. G. Alphonso ...	Crocker Range, N. Borneo Bau, Sarawak	14/11–3/12	87 nos.
Miss Chang Kiaw Lan ...	Kuala Sedili New Road, Johore ...	22–27/9	50 nos.
E. C. Abbe, L. Abbe and Kadim bin Tassim ...	Malaya (all States except Kelantan and Trengganu)	2–12/11	100 nos.
J. Carrick, I. Enoch and Kadim bin Tassim ...	Bako National Park, Sarawak ...	18/4–11/5	600 nos.
H. M. Burkill, Hassan bin Rani, Kadim bin Tassim	Chemara Research Station, Layang-layang, Johore	23/1–2/2	129 nos.

41. Mr. Sinclair's expedition to West Java took him to a game reserve on Pulau Handeuleum Sisi and P. Peutjang where the indigenous vegetation and representatives of large wild game still exist under protection. The islands are mostly coral beaches which have risen just above sea level and one can see much of the coral, now a greenish hue due to algae and age, amongst the tree roots. Lagoon formation typical of atoll islands is absent. On P. Peutjang the following tall trees were common: *Tetrameles nudiflora*, 120 ft.; *Ficus pubinervis* and *F. calophylla*, 100 ft.; *Pterygota horsfieldii* 40–100 ft., *Lagerstroemia speciosa*, 70 ft. Smaller trees were *Radermachera gigantea*, *Pterospermum javanicum*, *Ardisia lanceolata*, with *Sophora tomentosa* and *Messerschmidia argentea* frequent on the foreshore.

42. In Ceylon, while travelling to Britain on leave, Mr. Sinclair ascended to the summit of Pidurutalagala, 8,290 ft. From about 4,000 ft. to the top the vegetation is dwarf scrub and at the top *Osbeckia buxifolia,* a melastomaceous shrub with attractive red flowers, *Helichrysum buddleoides,* an everlasting with yellow blooms, *Disporum leschenaultianum,* a white flowered lily-like plant and *Ranunculus wallichianus* were seen. Just over half way up the mountain is a sphagnum bog with *Lycopodium carolinianum* and a rare everlasting *Anaphalis thwaitsii. Symplocos cordifolia* was seen slightly lower down. A visit was also paid to Hakgala Botanic Gardens some eight miles away.

43. The expeditions to Kerilla Estate, Sungei Mai Estate, Chemara Research Station, and the Endau Development Project were undertaken in continuation of the work recorded in previous annual reports of sampling the vanishing vegetation. In these four widely spaced areas (north, east, centre and south of the Malay Peninsula) forest in the process of being felled for cultivation gave a convenient opportunity of collecting from the fallen forest canopy. The work at Kerilla Estate yielded at least three new records for Kelantan.

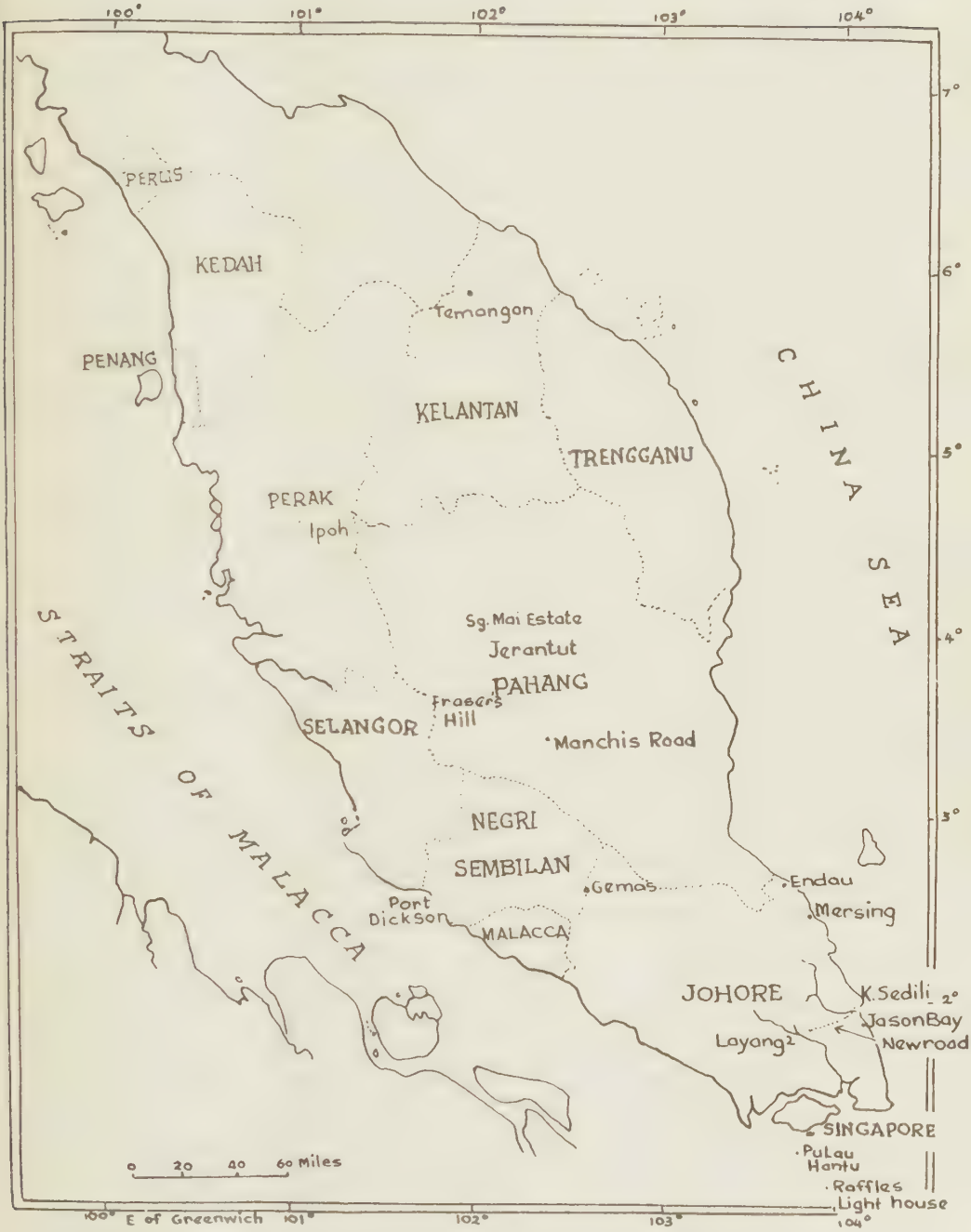
44. Similarly the visits to the Kuala Sedili New Road afforded an unusual chance of collecting in fresh water swamp forest, not the easiest kind of terrain in which to work. The road trace, cut through some five miles of swamp progressed at the rate of a chain or two per day, hampered by the lack of anything more substantial than sand to build up the roadway above water level and by every rainstorm that turned it into a morass. Tree specimens, epiphites and parasites were taken as bulldozers knocked the trees down. The road construction work was zealously watched for some three months by tiger, elephants and wild pig who left their pug marks each night in the freshly laid sand, and by day by gentle cooing *wah-wahs* and raucously protesting *enggang* (hornbills). Innumerable birds, lizards and small mammals could be seen which normally one never or seldom comes across. A portion of the area merits serious consideration for protection as a nature reserve.

45. Further north near to Mersing the coastal area has examples of raised beaches identified by the shells of living marine molluscs and one might expect the extensive sand lying under a foot of peat all along this road trace to have been of similar recent marine origin, but no sea-shells were observed. One must assume then that this area is a river alluvium.

46. Miss Chang's visit to the Kuala Sedili road trace proved profitable in the collection of forty different species of lignicolous *Polyporaceae* and *Agaricaceae.* The abundance of dead timber of trees knocked down in the road construction and the dampness of the habitat supplied suitable conditions for fungal growth.

47. The work at Layang-layang revealed two plants of interest. The land is on Rengam Series soils and carried good primary forest of which 800 acres was being felled for planting oil palm. The Botany Department of the University of Malaya had marked out quadrats for ecological analysis in the course of which it was found that in parts of the forest the dominant tree was *Kostermansia malayana* Soegeng, a close relative of the durian and a hitherto undescribed genus and species. Two seedlings have now been established at the Botanic Gardens. The other plant of interest was a twining *Gleichenia.* This genus is almost entirely sprawling and scandent. This record of a twining habit is the first for Malaya and has only once been recorded elsewhere in the

MAP SHOWING MALAYAN PLACE NAMES MENTIONED IN THIS REPORT.



region—by Nakai in the Rhio Archipelago. The plant is *A. truncata* (Willd.) Spr. and twining appears to be an unusual habit-form.

48. The expedition in the Ipoh district was made under the guidance of Mrs. B. E. Allen, a resident of Ipoh, who is an acknowledged authority on Malayan Pteridophyta. Opportunity was taken to collect on Gunong Bujong Malacca and Gunong Tempurong, limestone hills where the vegetation is all being burnt off preparatory to mining operations. Collections were also made at Bukit Batu Suloh and in the mining area of the Kinta Valley.

49. The collections made at Fraser's Hill, while Mr. Burkill was on casual leave, yielded two probably new orchid species. Further material will be sought at the next opportunity to send living plants to the Royal Botanic Gardens Kew where cultivation is more likely to be successful than in the humid heat of Singapore.

50. Mr. Alphonso visited the Crocker Range in North Borneo in search of material to introduce alive to cultivation in Singapore. A number of aroids was successfully brought back. Collections were made near Tenom, Tambunan and Patau, on the Keningau Plateau and on the Bainio and Biak Rivers, also at Bau in Sarawak. The weather was extremely wet making the field work very arduous. Nevertheless no botanist can always be a "fair weather" field worker and as the flora becomes better known collections in the wet season are possibly more likely to produce novelties than other times.

51. Mr. Burkill continued his collections of marine algae at Raffles Light, Singapore, and the nearby islands, and made smaller collections at Malacca and Port Dickson. An inspection of the northern portion of Jason Bay, by Kuala Sedili revealed only one single algal specimen, *Hydroclathrus clathratus,* but no mud-dwelling species for which the muddy coastal strand would seem suitable. Unusually large specimens of *Valonia ventricosa* J. Ag., up to 3 inches across were found on the coral reef of Pulau Hantu.

52. Beside the phanerogamic collection at Fraser's Hill, Mr. Burkill collected 34 numbers of lichen and 20 of mosses. The lichens together with others from Singapore and Kuala Sedili area were sent to experts in London and Holland for naming.

53. On most of these trips in Malaya samples of water from streams, ponds and swamps were taken for sending to Dr. Prowse at the Fish Culture Research Station, Malacca, for his work on phyto-plankton. Samples of water were sent from the Botanic Gardens Lake; Fraser's Hill; Kinta Valley, Perak; 94th mile Manchis Road, Pahang; Muar River near Gemas; Kota Tinggi; Kuala Sedili swamp, and central Johore.

54. This opportunity is taken to acknowledge the help given by the following persons in the above field work:

Mr. Dilmy, Director, Herbarium Bogoriense and Dr. Kostermans of Bogor.
The Master Attendant, Singapore.
Mr. D. St. G. Stewart, Manager, Kerilla Estate, Kelantan.
The Manager, Sg. Mai Estate, Pahang.
Inche Ismail bin Haji Ariffin, District Officer, Mersing, and Mr. W. F. Toft, Manager, Endau Development Project, Kg. Hubang, Johore.
Mr. Inder Singh, District Engineer, P.W.D., Kota Tinggi, Johore.
Mr. J. Comber, Asst. Manager, Sapong Estate, North Borneo.
Mr. J. Seal of the Civil Aviation Department, Sarawak and Honorary Curator of the Kuching Herbarium.
Mr. J. A. R. Anderson, Forest Department, Sarawak.
Mr. E. A. Rosenquist of Chemara Research Station, Layang-layang, Johore, and Prof. H. B. Gilliland of the University of Malaya Singapore.

55. The series "Singapore Field Numbers" for recording plant specimens has been falling into disuse for a number of years owing to collectors using their own series. While the number of field workers contributing to the herbarium was relatively small, their use of the *S.F.N.* series was easy to control, but now the number is greatly increased and extends well beyond the Gardens' staff, its application is difficult. From the beginning of the year the use of the *S.F.N.* series was discontinued, but its principle was modified to the opening of a herbarium accession register in which all material entering the herbarium for retention is registered under its originator's field number.

XVI. EXCHANGE AND ACQUISITION

56. The number of specimens received in exchange from other institutions was 2,130. The Herbarium Bogoriense was again the highest contributor; most of the specimens were collected by Dr. A. Kostermans. It is notable that the amount of material collected by him exceeds that obtained by any other present-day collector in South-east Asia. As he collects in quantity his duplicates are widely distributed to the very great benefit of collaborators of *Flora Malesiana* and other students of South-east Asian botany. A summary of institutions contributing to the Singapore herbarium is given in Appendix IV.

57. Distribution of specimens from the Singapore Herbarium amounted to 3,786, details of which are given in Appendix IV.

XVII. TAXONOMY

58. Mr. Sinclair continued his work throughout the year on Malaysian *Myristicaceae* (Nutmeg Family) in collaboration with the Flora Malesiana Foundation, chiefly on the genus *Knema*. Even though he was officially on leave in Europe, 1st April to 13th October, he visited and worked at a number of European herbaria—Edinburgh, Kew, British Museum, Cambridge, Leiden, Utrecht, Brussels and Paris—on a small Government grant. While travelling to Europe he visited Peradeniya in Ceylon, and on his return from Europe he spent a week at Calcutta.

59. Collections from the Smithsonian Institution, Washington, U.S.A. were sent to Leiden for him to work on there as that institution will not send specimens on loan to Singapore. Likewise Peradeniya and the British Museum were unable to lend material. Kew, Paris and Utrecht place restrictions on their material, while at Paris there is a great deal of unmounted and undetermined material which workers must search over for themselves. It was thus essential for Mr. Sinclair to visit these institutions as otherwise he would not have been able to see types, historical collections and much of their general material. Without such essential basic study it is impossible to make any accurate and comprehensive revision.

60. This work had to be done rapidly owing to limitation of time, but much useful knowledge was gained whereby several name changes, reductions and corrections will have to be effected. No satisfactory or complete research of this kind can be done in Singapore entirely or even at Kew or Leiden alone. Certainly Singapore holds the key collection of the local flora, but regional aspects of plant dispersal and evolution, oblivious of and far beyond political boundaries have to be understood in the preparation of a local flora. The Malaysian region presents a well-defined phytogeographical unit and for this reason the Department's collaboration in the Flora Malesiana project is the most important undertaking as it serves to place the Malayan flora in its proper regional context.

61. Mr. Chew Wee Lek continued his study of the *Moraceae* while at Cambridge reading for a higher degree. Dr. Furtado sorted out and renamed where necessary the following genera: *Ardisia, Maesa, Embelia* and *Barringtonia.* A number of new species were described for the first time in the *Gardens' Bulletin* 17 (2), December 1959, as a result of this work. Dr. Furtado also was chiefly responsible for editing the posthumous publication of five new dipterocarp species from Borneo in the same issue.

62. Miss Chang Kiaw Lan took charge of the mycological collection which had not been added to nor studied since Mr. Corner retired in 1946. Collections were sorted out on the taxonomic system of Clements and Shear (*The Genera of Fungi,* 2nd edition, 1931). Many new collections were made during the year but identification presents difficulties owing to shortage of mycological literature in the Gardens' Library. Mastering the latest methods of identification based on microscopic analysis and colour reactions with stains is a research in itself and it is hoped this officer may go overseas for training in these developments. The number of mycologists in Singapore and Malaya has been seriously depleted in recent years by retirements and it is an urgent necessity to maintain an adequate expertise on this subject as, *inter alia,* plant protection and plant pathology depends in a large measure on a knowledge of fungi.

63. It is a pleasure to record co-operation with persons outside the Gardens' staff who are studying the taxonomy of local plants. Mr. Tan Ah King of Midland Estate, Kulai, Johore, has been studying palms in the field and has collected specimens for the Singapore herbarium. Palms, particularly rotans, are of considerable economic importance and because of the straggly length of their stems, often intertwined with a half dozen or so tree canopies, and because of their acute thorniness, they are a very difficult group to study.

64. Dr. Anne Johnson of the Botany Department of the University of Malaya has been working on the Sphagna of Malaysia and her monograph describing twelve species, three of them new, and one new variety was published in the *Gardens' Bulletin* 17 (2).

65. Dr. E. C. Abbe, Professor of Botany of the University of Minnesota and Mrs. L. Abbe of Department of Biology, Macalister College, St. Paul, Minnesota spent three weeks in Singapore in October and made use of the herbarium facilities prior to setting out on a 6-month expedition in the Federation of Malaya, Thailand, Vietnam and Cambodia to study *Fagaceae* (Oak family) in the field.

66. The Druids who developed a culture in central and western Europe before the Roman invasions of Gaul, Iberia and Britain took their name from the oak, vast forests of which covered Europe at that time. (*Druidh,* Gaelic, Men of Oak). In more recent times the value of oak timber in northern Europe and temperate North America has had a great economic importance and popular glamour. Even the vestige of druidic rites persists in the Christian usage of mistletoe at Christmas. It is little wonder therefore that many people, botanists of temperate countries included, think of the oaks as essentially typical of northern temperate regions. In fact, however, the family is more tropical than temperate and has probably had its origin in South-east Asia, where the order is particularly well represented. It is to be hoped that when the results of the Abbes' field work is published a very important chapter will be added to our knowledge of the regional flora on a group of plants of which so far too little is known.

67. Two visiting research workers were at different times given facilities for taxonomic and field study of the order *Rutaceae* of which *Citrus* is the most important family. These workers were Mr. M. B. Spurling of the Department of Agriculture, Adelaide, South Australia and Mr. A. Santiago of the Department of Agriculture, Federation of Malaya.

68. Collaboration such as the above is always welcome. The field for research is immense and the facilities of the Department will always be fully at the service of research workers, especially trained botanists from the main herbaria and Universities of Europe and America. It is on such institutions where classical collections and type specimens are stored that a knowledge of tropical botany is to a large extent dependent.

69. Much material was received from other institutions for naming, in particular from the Department of Chemistry, Kuala Lumpur, in connexion with the phytochemical survey of the Malayan flora, and from the Forestry Departments of the Federation of Malaya and the Borneo territories.

70. Routine mounting, repairing of damaged sheets and poisoning proceeded normally.

71. The herbarium has now reached saturation. With cracking of the walls, recorded above, additional weight cannot now be added to the upper floor and the space available there for more cabinets is thus not usable. Consideration must therefore now be given to further building.

XVIII. LOANS OF HERBARIUM MATERIAL

72. Specimens sent on loan totalled 2,517 sheets. The majority went to Leiden for *Flora Malesiana* workers. The principal families were *Bombacineae, Celastraceae, Euphorbiaceae (Trigostemon), Menispermaceae, Staphyleaceae* and certain genera of *Roseaceae, Lauraceae, Sterculiaceae, Leguminoseae, Guttiferae* and *Tiliaceae* for Dr. Kostermans at Bogor. Distribution is given in Appendix IV.

73. Specimens received on loan for study at Singapore totalled 2,651 sheets which were 2,606 sheets of *Myristicaceae* for Mr. Sinclair from Bogor and Kepong and 45 sheets of *Myrsinaceae* for Dr. Furtado from Kuching.

XIX. PLANT UTILISATION

74. The Director in the course of his work on marine algae collected samples in bulk of certain common species and sent them to the Tropical Products Research Institute in London for chemical analysis. Two species submitted warranted further consideration.

HORTICULTURE

XX. GARDENS MAINTENANCE

75. The Gardens were well maintained. Lawns were kept mown and tidy. A large number of beds was prepared and twenty-two existing beds were reconditioned and manured. Seventy-six shrubs and trees were planted. Eight hundred and forty-one plant labels were made or renewed.

76. The water in the Lake was drained to permit clearing out of debris. At the same time the pandans on the island there were cut back. Attempts to re-establish the water lilies have not been successful. These plants succumbed when the lake was drained and remained empty for some weeks in 1956 to

Lawrence Niven, the first Superintendent of the Botanic Gardens, Singapore. 1860–1875. He laid out the Gardens and his landscaping has remained almost unaltered to this day

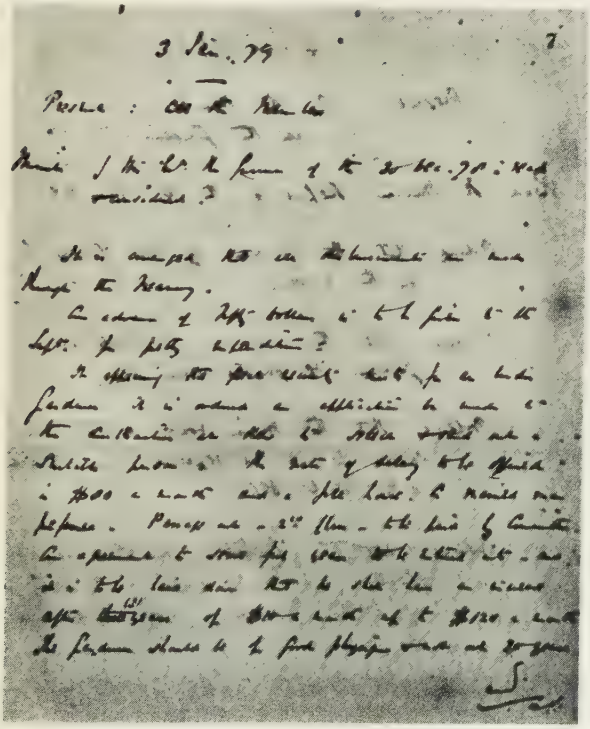


Photo-copy of the minutes of the Gardens' committee meeting giving authority for recruitment which resulted in the appointment of Nathaniel Cantley in 1880. Under Cantley's administration the Singapore herbarium was established and the Gardens developed from a pleasure garden to a botanical, horticultural and forestry institution

[*Copy*]

3 Jan. 79

Present: All the members.

Minutes of His Exc. (?) the Governor of the 30 Dec. 78 read and considered.

It is arranged that all disbursements are made through the Treasury.

An advance of Fifty Dollars is to be given to the Supt. for petty expenditure.

It appearing that great necessity merits for an India gardener [sic.] it is ordered an application be made to the authorities at Kew to select and send out a suitable person. The rate of salary to be offered is $80 a month and a free house. A married man preferred. Passage out—2nd class to be paid by Committee. An agreement to serve five years to be entered into and it is to be laid down that he should have an increment after three (3) years of $10 a month up to $120 a month. The gardener should be of good physique and not over 30 years.

[initialled] C.C.S. [Cecil Clement Smith.]
C.S. [Colonial Secretary.]

from a short section of th

H. M. Burkill

H. M. Burkill

(*Upper*) *Ischaemum muticum* Linn., forming a carpet from high tide level to the top of the beach. Note surface runners. Other grasses invade at the upperlimit

(*Lower*) *Cyperus stoloniferus* Retz. The lowest of the beach plants, growing below high tide level. Root runners are subsurface at about 6 inches depth

Note: black lumps in foreground are clay pebbles

ina Sea Coast near Mersing

H. M. Burkill

Ipomoea pes-caprae (L.) Sweet.

From the top of the beach sending out surface runners, 30–40 ft. long, to below high tide level.

H. M. Burkill

Vitex ovata Thunb.

At the crest of the beach and inundated only at high water spring tides.

FRESHWATER SWAMP FOREST

Kuala Sedili new road

October 1959

H. M. Burkill

H. M. Burkill

permit repairs to the retaining wall. They were one of the most decorative attractions for early morning visitors to the Gardens and continuous efforts will be made to get them growing again. It is thought that the turtles (*Trionyx cartilagineus*) are responsible for eating their roots. *Salvinia auriculata* Aubl., which was introduced some years ago, has recently spread rapidly on the Lake, taking as it were, the place vacated by the water lilies. Regular collection and destruction is carried out lest it become a pest. Like that great pest of waterways in many countries, *Eichornia crassipes,* which is grown in nearly every pond in Singapore and Malaya for fish and pig feed, and is yet not a problem in the Peninsula, *Salvinia* may possibly be benign or even useful in fish farming.

XXI. PESTS AND DISEASES

77. The long-tailed macaque monkeys (*Macaca irus*) remain the worse pests and much damage is attributable to them. About thirty were shot thanks to the services of an assistant from Raffles Museum. Four others were caught alive in trap cages for the Department of Zoology of the University of Malaya.

78. Misguided people occasionally release monkeys from captivity in the Gardens. Most conspicuously are those with collars or wire attachments. Release in the Gardens not only contravenes the Gardens' by-laws, but exposes the wretched monkey to certain cruelty at the hands and teeth of its own kind for trespassers in each troop's preserve suffer a prolonged chastisement inevitably ending in some permanent disability, if not death.

79. No less than thirty plants were mauled by monkeys and six tree saplings were killed. Cannas received regular uprooting. These depredations have to be combatted by enclosing the more valuable permanent plantings in wire netting gages till the plants are big enough to withstand being swung on and pulled about. Forty plants have been so enclosed.

80. There has been a marked check in the incidence of the Rhinoceros Beetle (*Oryctes rhinoceros*) and there has been less damage done to palms. Constant watch is kept on compost heaps and the grubs are collected and destroyed. More serious is the damage done by the Red Stripe Weevil (*Rhyncophorus ferruginea*) as control is much more difficult. Regular patrols were kept on the palms involving climbing to the crown, sometimes 60 ft. high, to spray and dust powder into the leaf brackets. Infected trees unfortunately show the symptoms of attack when it is too late to save the tree. Specimens of the following died during the year: *Coelococcus carolinensis, Stevensonia grandifolia, Adonidia muellerii, Acrocomia fuciformis, Sabal princeps, Acanthorhizia aculeata, Hyophorbe amaricaulis, Oreodoxa regia* and *Phoenix madagascariensis.*

81. There has been no serious fungal disease. *Helminthosporium oryzae* is present on the Manila grass (*Zoysia* sp.) in the plant house quadrangle, but its activity has not been enough to be as unsightly as in previous years. *Phythophthora palmivora* and *Pectobacterium caratovorum* were diagnosed on a number of orchid seedlings and fully grown plants. Regular spraying against commoner pests and diseases was carried out.

XXII. ISTANA NEGARA DOMAIN

82. The grounds were kept in a tidy condition, but difficulty was experienced with some of the mowers which were constantly breaking down.

83. The Gardens in front of the Istana Negara and the lower garden and the gardens attached to the other houses in the Domain were all upkept. That

at Sri Temasek (the former Chief Secretary's House) received additional attention as the change in use of the house to the State Guest House called for extra potted plants and decoration for special occasions.

84. The visit of H.R.H. The Duke of Edinburgh in February, and the reception held to which some 4,000 guests were invited necessitated a greatly increased number of pot plants. Twenty groups of floral decorations were put up at Clifford Pier and the Victoria Memorial Hall was decorated from Domain resources. At one time a lorry load of plants was leapfrogging the royal party from one function to the next but one ahead. Later in the year decoration was supplied for the Constitutional Exposition, the opening of the first Legislative Assembly, and the "Government in Action" Exhibition. The Domain nursery to meet these calls maintained a stock of some 2,000 foliage and flowering pot plants, 50 beds of orchids and over 30 beds of other flowering plants.

85. The hedge around the lower part of the potting yard was removed and replaced by a wire fence. Beds of *Hymenocallis* were planted alongside the fence to supply cut flowers.

86. To supply adequate potting soil and humus, soil was burnt regularly, and cattle manure and spent hops were obtained. As in previous years a few loads of elephant manure were also obtained for the especial purpose of acting as a starter for composting. The *fons et origo* of this manure is by way of being a professional circus hand and odd jobbing elephant now living in semi-retirement on the outskirts of the City. Had we not made its acquaintance some years ago we would never have known what remarkably versatile talent it possesses. It is furthermore to be congratulated on its tremendous productivity.

87. The Domain was open to the public on Christmas Day.

88. The horticultural staff of the Domain competed in the 1959 Singapore Flower Show and won three prizes in the pot plant sections.

89. Periodic visits were made to Changi Cottage to give advice on the maintenance of the garden.

XXIII. ORCHIDS

90. The expansion of the orchid collection continued and more of the plant introduction nursery was removed from the enclosure to Lawn Y to make room for the additional orchid plants. A slatted roofed house was completed for the species and the whole collection was moved to it from the Bear Pits on Lawn T. Four of the seedling houses in the nursery were surrounded with aluminium shade screening. This helps to break direct sunlight of the early morning and late afternoon and to maintain slightly moister conditions by reducing air movement and drying out, yet not so damp as to induce rotting.

91. During the year sixty-four successful crosses were made, of which thirty-five yielded fertile pods. The work of crossing had to be suspended for about half the year owing to loss of staff by retirement. Seed from fertile pods raised by the Gardens together with seed from eleven other pods donated by local residents and seed received from New Guinea, Australia and Florida were sown in the laboratory in flasks on agar with Vacins' prescription plus diluted coconut water. The Gardens are grateful to Messrs. Braga, Lewis,

George C. C. Chan, and Mrs. P. L. Tan of Singapore, Dr. Yeoh Bok Choon of Johore Bahru, Mr. J. S. Womersley of Lae, New Guinea, Mr. E. de Saram, Florida, U.S.A., and Mr. F. Tiernay of Australia for donations of seed.

92. An average figure for the number of flasks in use in the laboratory during the year was more than 1,000. The seedlings from 477 flasks were potted out into community pots in the nursery.

93. Manuring followed the policy of using both foliar and root manures. Plants in thumb pots were manured weekly. Older plants were manured monthly. Weekly spraying with insecticides and fungicides was carried out. Bedded plants were manured weekly and sprayed twice weekly.

94. Many plants were received as gifts or on exchange and the Gardens are indebted to the following: Dr. Womersley of Lae, New Guinea; Mr. E. de Saram, Florida, U.S.A., Longwood Gardens, Pennsylvania, U.S.A.; Mr. E. D. Menninger, Florida, U.S.A.; Mr. Ong Kee Chong and Mr. Donough of Kuching, Sarawak; Mr. P. Smithers, London, England; Mr. P. Kuok, Johore Bahru and Mr. Voon, Messrs. Kian Kee Garden, Mr. T. J. Hale and Mr. Chia Kay Heng of Singapore.

95. The orchid species collection was enlarged by sixty-one collections mostly from Johore with a few from Malacca, British North Borneo and Sarawak.

96. The following crosses which had flowered before were named and registered during the year:

1260 Vanda Yukum B. (*V. dearei* × V. Gilbert Triboulet) Cross made and registered by Mr. Braga of Singapore.

1400 Vandanthe Noalproth (V. Norbert Alphonso × V. Rothschildiana).

1425 Vanda Muthiya (*V. luzonica* × V. Kapoho).

97. First flowerings during 1959 were:

2432 Dendrobium Sonia Tan (D. Gracia Lewis × D. Lady Constance).

2303 Vandanthe Lee Chin Chin (V. Ruby × Vandanthe Ellen Noa).

1715 Vanda Dolores Anne (V. Ruby × *V. tessellata*).

1479 Aranda Wong Mook Kwi (A. Ishbel × V. Diana).

1785 Vanda Mong Lan (V. Gilbert Triboulet × *V. tessellata*).

1883 Dendrobium Memoria Mohamed Nur (D. Ursula × D. Alice Spalding). This cross is named in memory of Haji Mohamed Nur B.E.M. who served the Botanic Gardens for 46 years.

1930 D. Lim Tar Fang × D. Rosalind Lee.

1744 *A. hookeriana* var. *luteola* × *Vandopsis lissochiloides.*

1534 V. Ruby Prince × Vandanthe Rothschildiana.

1218 A. Maggie Oei × *A. hookeriana.*

1672 *Brassia maculata* × *On. lanceanum.*

2095 V. tricolor v. Charlotte Jones × V'the Onomea.

2436 D. d'Albertissii × D. bromfieldii.

1055 V. Audrey × V. Prolific.

1819 V. Ruby Prince × V. Kapoho.

2268 V. Ruby Prince × V. Caroline J. Robinson.

1823 V. Kapoho × *V'opsis lissochiloides.*

2173 D. trilamellatum × D. Schueleri.

2440 D. leporinum × D. Leeanum.

2449 D. Pompadour var. Phra Taba × D. Mary Neal.

Those listed first with cultivar names were registered.

XXIV. SUCCULENTS

98. With the retirement of the Curator in charge of this collection, no expansion was undertaken. The collection was kept under care and maintenance and propagation of species was done whenever possible. The use of broken coral as a top dressing was extended to the major portion of the collection.

EXTENSION WORK

XXV. TRAINEES

99. Seven men were accepted for training and worked for varying periods during the year. They came from Shell Coy., Seria—2; Agricultural Department, Brunei—1; Trafalgar Home—2; and Labour Department—2.

XXVI. SUPPLY OF PLANTING MATERIAL

100. A total of 17,580 plants, cuttings, lots of bulbs and packets of seeds were sold to the public during the year. This compares favourably with last year's sales. Revenue to a value of $22,201.71 cents was obtained, of which $18,676 came from orchid sales and the balance from other plants.

101. The Gardens continued to supply planting material free of charge to Singapore Government Departments, charitable institutions, the University of Malaya and the Services. 3,403 plants were supplied to 36 Government-aided schools; 4,007 went to Government Departments, hospitals, police stations, the Airport and service stations, and 763 plants to Nanyang University and charitable organisations.

102. The Gardens supplied potted plants to official departments, military, welfare and cultural organisations for decoration at special occasions; 2,930 pots were so loaned.

XXVII. EXHIBITIONS AND SHOWS

103. The Gardens participated in several shows during the year and won awards.

104. Over 150 prime plants of orchids, *Saintpaulia ionantha,* cacti and succulents, and Begonia species were sent to Kuala Lumpur for display at the Malayan Agri-horticultural Association Exhibition. This was the best horticultural exhibit at the show and created a great attraction. The material taken for sale was all sold out before the Exhibition was officially opened! Revenue was $1,182.50.

105. Mr. Burkill and Mr. Alphonso were both judges in the competitive sections of the M.A.H.A. Exhibition.

106. The Singapore Gardening Society staged its annual show at the Happy World Stadium during 3rd-5th April. The Botanic Gardens put up a large (400 sq. ft.) landscape of foliage flowering and orchid plants set around a pond as a central motif.

107. The Malayan Orchid Society held its third post-war show at the Happy World Stadium on 9th-11th September. The Botanic Gardens put up the largest single exhibit of 150 of its choicest orchid plants. The Gardens won a Challenge Cup awarded to the originator of the best Malayan hybrid in the show. The plant was a variety of Arandanthe Grandeur and was given

the varietal name of Ena Goode as a mark of esteem of the wife of Singapore's first Yang di-Pertuan Negara. The parentage of this plant is:

V. dearei × *E. sanderiana*

|

V. Ellen Noa × *A. flos-aeris*

|

A. Grandeur, var. Ena Goode

108. The Gardens exhibited at the Malayan Orchid Society monthly shows and won the following awards:

Award of Merit

Spathoglottis Premier var. Chantek.
Dendrobium Murray Henderson var. Tanglin Beauty.
Arandanthe Grandeur var. Ena Goode.

109. In July the Gardens participated at the Malacca State Agricultural Show. A few select plants were taken together with a large quantity of cut flowers. The Gardens are indebted to Mr. and Mrs. M. E. L. Robey of Malacca for the loan of vases and arranging of the blooms of exhibition. A quantity of orchid cuttings and seedlings were sold at the show and netted $930 revenue.

110. The Penang Gardening Society Show was also held in July and the Gardens sent a consignment of orchid blooms.

111. Orchid blooms were sent to the following exhibitions overseas and our thanks are offered to Messrs. B.O.A.C., QANTAS and A.I.I. who flew them there:

Pakistan Flower Show, Karachi.
The Daily Telegraph Flower Show Festival, England.
Royal Horticultural Society Chelsea Flower Show, England.
Sissinghurst Flower Show, England.
The Olympic Orchid Festival, Melbourne, Australia.
The Victoria Orchid Club Show, Australia.

XXVIII. SINGAPORE GARDENING SOCIETY

112. Mr. H. M. Burkill was President for the years 1958/59 and 1959/60. Mr. A. G. Alphonso was committee member for 1958/59 and was elected vice-President for the 1959/60 year. Mr. A. G. Alphonso was honorary show manager for the 1959 Flower Show and Mr. Wong was assistant manager. The following members of the staff were judges at the Show: Messrs. H. M. Burkill, A. G. Alphonso, Lee Sai Kwong, Wong Siew Hang, G. H. Addison, J. L. Pestana and M. Ramiah. A number of the Society's meetings were held at the Botanic Gardens when demonstrations and talks on different aspects of gardening were given by members of the Botanic Gardens staff.

XXIX. MALAYAN ORCHID SOCIETY

113. Mr. A. G. Alphonso, Mr. G. H. Addison and Mr. J. L. Pestana served on the committee. Mr. Alphonso was Hon. Show Manager and Secretary for the Society's Annual Show. Mr. Wong Siew Hang was Assistant Show Manager. Several of the Society's monthly meetings were held at the Botanic Gardens. Mr. Addison was editor of the Malayan Orchid Review for part of the year and contributed articles and numerous photographs and descriptions of new orchid hybrids.

XXX. MALAYAN NATURE SOCIETY

114. Mr. Burkill served on the main committee of the Society and on the committee of the Singapore branch. Two field trips were arranged in the Singapore Nature Reserves.

XXXI. MALAYAN AGRI-HORTICULTURAL ASSOCIATION

115. Mr. Burkill served on the committee of the Society till May.

XXXII. FILM PRODUCTION

116. Some ten films were made in whole or in part in the Gardens during the year by various film studios when the Gardens became resplendent with glamorous stars and all the panoply of high pressure production.

117. A British Broadcasting Corporation television team also visited the Gardens and arranged an interview with the Deputy Prime Minister in a Gardens setting. A free-lance maker of films for T.V. screening also took shots in the Gardens.

XXXIII. ADVISORY

118. Assistance was rendered to the P.W.D., schools and other Government organisations in devising planting schemes for compounds and roadsides. Many requests from private individuals and unofficial bodies were dealt with. Requests were varied but the most frequent referred to planting of shade trees or the removal of trees grown too large or thought to have become dangerous. Except for the business centre of the City, the residential areas are remarkably well planted up and it is undoubtedly this extensive use of trees that adds not only to the beauty of Singapore but sensibly affects the climate. Gone is most of the forest, and only by the use of trees can the heat of the sun be tempered. Every encouragement is given to plant trees.

119. The herbarium staff continued to deal with enquiries relating to the identity, purity and uses of plants of economic use. Medicinal use of plants is a major source of interest not only for officinal purposes but also for research. Sometimes even the pedlars of non-officinal quack nostrums come to seek the opinion of western science.

APPENDIX I

STAFF OF BOTANIC GARDENS, 1959

Divisions I—III

Appointment	*Holder*	*Notes*
Director ..	H. M. Burkill, M.A. (Cantab.), F.L.S. ..	On overseas leave from 16/12
Assistant Director ..	*Vacant*	——
Keeper of Herbarium	J. Sinclair, B.Sc. (Edin.) ..	On overseas leave 1/4–13/10
Botanists ..	1. Chew Wee Lek, B.Sc. (Malaya)	On fellowship at Cambridge University with effect from 18/9/57
	C. X. Furtado, D.Sc. Bombay)	Re-engaged pensioner as training replacement *vice* Mr. Chew Wee Lek
	2. Chang Kiaw Lan, B.Sc. (Malaya), (Miss) ..	Appointed 7/7. Appointment held against vacancy of Assistant Director
Curators ..	1. G. H. Addison ..	On leave prior to retirement with effect from 1/3. Retired 12/6
	Vacant	From 1/3
	2. A. G. Alphonso	
Librarian ..	Tan Kim Ho, B.Sc. (Malaya)	On Colombo Aid Scheme Training Award in Australia 20/2–26/11
Executive Officer ..	F. A. Pereira	1/1–15/3
	Mohamed bin Osman ..	16/3–30/4
	R. S. Mani	1/5 onwards
Laboratory Assistant (Special Grade) ..	J. L. Pestana	Retired 31/7
	Vacant	From 1/8
Horticultural Assistant	Lam Hin Cheng ..	On Scholarship at Royal Botanic Gardens, Kew, 24/9/57–9/10/59. Acting Curator from 10/10/59.
Herbarium and Museum Assistant ..	Mohamed Shah bin Haji Mohamed Nur	

METEOROLOGICAL REPORT

BOTANIC GARDENS, SINGAPORE 1959

Reading daily at 9.30 a.m. local time at Gardens' Office

1959	Total Rainfall	Highest fall in 24 hrs.	No. of days rainfall	Mean Max. Temp.	Highest Max. Temp.	Mean Min. Temp.	Lowest Min. Temp.	Mean Temp. Dry Bulb	Mean Temp. Wet Bulb	Mean R.H.
	ins. *	ins.	°F	°F	°F	°F	°F	°F	°F	%
January	10.78 (11.39)	2.04	19	85.0	89.5	74.0	71.5	76.7	75.6	83.9
February	3.88 (7.30)	0.85	11	89.2	91.8	74.8	72.5	81.6	73.4	80.3
March	11.72 (8.48)	2.21	18	88.5	93.0	77.0	71.5	80.2	76.2	84.1
April	8.65 (8.12)	2.68	13	88.6	92.8	75.3	73.0	81.6	78.0	85.0
May	4.14 (7.41)	1.47	12	90.5	94.0	76.4	73.5	83.0	78.5	82.4
June	11.25 (6.65)	3.17	18	88.1	93.0	76.3	71.2	81.7	78.0	81.3
July	4.59 (6.17)	1.89	12	88.5	93.5	74.8	73.5	82.1	78.1	82.7
August	3.64 (7.36)	0.88	14	86.1	91.0	75.6	72.5	80.6	76.7	83.6
September	6.30 (7.70)	2.15	13	87.3	90.0	75.7	72.0	82.3	76.8	78.5
October	5.28 (8.03)	1.14	15	89.0	91.0	75.2	71.5	82.4	78.0	83.3
November	13.76 (10.62)	3.46	21	87.5	90.5	74.4	72.0	80.6	77.4	85.6
December	12.95 (9.93)	1.78	24	86.6	91.0	74.1	71.5	79.7	73.4	84.7
Total/Mean ..	96.94 (99.16)	—	190	87.9	91.8	75.2	72.2	81.0	76.7	82.6

* Mean for the period 1914–1959 (46 years).

METEOROLOGICAL RECORD

BOTANIC GARDENS, SINGAPORE 1959

Reading Daily at 8.00 a.m. Local Time at Orchid Enclosure from 1-1-59

1959	Total Rainfall	Highest fall in 24 hours	No. of days Rainfall	Mean Max. Temp.	Highest Max. Temp.	Mean Min. Temp.	Lowest Min. Temp.	Mean Temp. Dry Bulb	Mean Temp. Wet Bulb	Mean R.H.	Mean Min. Grass Temp.	Mean Earth Temp. 4"	Mean Earth Temp 1'	Mean Earth Temp. 4'	Mean Solar Rad. Thermometer
	ins.	ins.		°F	°F	°F	°F	°F	°F	%	°F	°F	°F	°F	°F
January	8.73	2.00	18	85.0	89.0	73.1	70.5	75.0	74.1	95.9	72.2	79.4	83.7	82.9	—*
February ..	3.68	0.72	11	88.5	91.5	73.7	71.8	75.6	75.0	97.4	72.5	80.8	83.4	83.8	—*
March	11.62	1.40	19	87.6	93.5	73.2	70.0	75.7	74.9	96.1	70.8	80.5	83.3	83.0	154.3
April	9.32	2.76	15	84.4	91.2	74.3	72.5	76.8	76.1	96.7	72.1	80.8	83.3	83.6	143.0
May	3.96	1.38	11	88.1	91.5	75.2	73.5	77.8	77.1	96.7	72.5	82.0	84.3	84.7	143.9
June	10.67	3.37	19	86.6	92.0	75.0	71.0	77.2	76.8	96.8	72.2	81.9	83.2	84.0	134.0
July	4.71	1.81	13	87.4	90.0	75.2	70.5	79.6	76.9	95.7	73.2	82.0	83.2	84.1	140.5
August	3.35	0.89	10	85.4	89.0	74.2	71.8	76.8	75.9	95.7	72.8	81.4	82.8	83.6	137.2
September ..	5.57	1.80	13	84.4	91.0	74.1	71.0	77.1	76.2	96.3	72.9	81.8	83.0	83.7	142.2
October	4.93	1.25	16	87.3	90.0	74.3	71.0	77.5	75.9	95.5	73.1	82.5	84.2	84.6	142.5
November ..	14.26	3.38	18	85.9	88.5	73.3	71.0	76.3	75.3	95.8	72.4	80.9	82.0	83.1	140.2
December ..	13.03	1.92	22	88.7	89.5	73.1	70.0	75.3	74.7	97.5	72.7	79.3	81.1	82.0	136.3
Total/Mean ..	98.83	..	185	86.6	90.6	73.9	71.2	76.7	75.7	97.7	72.4	81.2	83.2	83.6	141.4

*Not recorded.

APPENDIX IV

SUMMARY OF DISTRIBUTION OF EXCHANGES AND LOANS

Institution	EXCHANGE		LOANS	
	NO. OF SPECIMENS		NO. OF SPECIMENS	
	Out	In	Out	In
Arnold Arboretum	399	..	..	..
Bailey Hortorium	16	..	..	..
Bangkok	52	..	1	..
Berlin	75	..	..	..
Bogor	182	1,190	905	2,439
British Museum	96	..	..	..
Calcutta	14	..	..	..
Cambridge	22	69	125	..
Dehra Dun	30	..	..	..
Edinburgh	519	..	..	..
Goteborg	4	..	..	..
Groningen	48	..	..	..
Kepong	36	..	..	167
Kew	741	..	37	..
Kuala Lumpur (D. of Chem.)	..	176	..	..
Kuching	43	..	..	45
Lae	96	78	..	..
Leiden	634	121	1,294	..
Manila	440	350	..	..
Manokwari	..	7	..	..
Mauritius (Sugar Ind. R. I.)	..	21	..	..
Munich	94	..	..	..
New York	102	..	155	..
Paris	76	..	..	..
Sandakan	67	118	..	..
Total ..	3,786	2,130	2,517	2,651

APPENDIX V

INSTITUTIONS AND PRIVATE COLLECTORS FROM WHOM PLANTS AND SEEDS WERE RECEIVED ON EXCHANGE IN 1959

Australia	Botanic Gardens, Canberra.
France	Centre de Recherches Agronomiques de Province Villa Thurat (A.M.).
Japan	Osaka University.
Malaya	Singapore—E. V. Lin & Co., Singapore Gardening Society; Mrs. Gracia Lewis; Mr. A. G. Banfield; Mr. A. Voon; Malayan Trading Co. Ltd.; Mrs. J. MacDougal; Kian Kee Gardens; Mrs. Siegruhn; Mrs. E. M. Airriess; University of Malaya; Mrs. Bond. Perak—Mr. Woo Chee Meng, Teluk Anson. Selangor—Department of Chemistry; Mrs. D. J. Maslin, Kuala Lumpur. Johore—Mr. Philip Kuok; Istana Gardens of Johore Bahru; Mr. Tan Ah King, Kulai. Malacca—Mr. M. E. L. Robey. Penang—Botanic Gardens.
New Guinea ...	Forest Department, Division of Botany, Lae.
North Borneo ...	Department of Agriculture; Department of Forests.
Sarawak	Bako National Park; Agricultural Department; Mrs. Donough, Kuching.
United Kingdom ...	Eden (Battle) Ltd., Sussex.
United States of America	Mr. E. de Saram, California; Dr. R. Fosberg, Washington (plants ex Bali); Cypress Gardens Florida; Mr. Menninger, California, Gates Cactus Inc., California; California Jungle Gardens; Mr. R. H. Gast, California; Department of Education and Research, Longwood Gardens, Pennsylvania; Makiki Nursery, Hawaii.

APPENDIX VI

INSTITUTIONS AND PRIVATE COLLECTORS TO WHOM PLANTS AND SEEDS WERE SENT ON EXCHANGE IN 1959

Australia	Botanic Gardens of Brisbane and Adelaide.
Bermuda	Department of Agriculture.
Brazil	Botanic Gardens, Rio de Janeiro.
Ceylon	Department of Agriculture.
Czechoslovakia ...	Botanic Gardens of Prague; University of Brno; Charles University; Institute of Yang Natural Philosopherin Praqueq, Vysocany; Kaul Zartos and Davidik Vactor, Krasna Flora; Horni Borg, 77 Okres Velke Mexirrii.
Denmark	Botanic Gardens of Copenhagen University.
Egypt	Middle Egypt Botanic Station.
Fiji	Department of Forests.
Finland	Botanic Gardens of the Universities of Turku and Helsinki.
Ghana	University College.
Holland	Botanic Gardens of Amsterdam and Delft.
Hongkong	Gardens Division of Urban Services Department.
Hungary	Hortus Agrobotanicus, Szentes; Botanic Gardens of Budapest University; Botanic Gardens of the University of Szeged; Botanikai Kutata Intezete, Vacraldt.
India	Director of Horticulture, New Delhi; Forest Research Institute, Dehra Dun; Indian Agriculture Research Institute, New Delhi; Government Fruit Research Station, Saharanpur; Botanic Gardens, Calcutta; Central Arecanut Research Station.
Italy	University of Catania; Botanic Gardens, Milan.
Japan	Izu Pharmaceutical Gardens, Shizuoka; Osaka Botanic Gardens; Satake Engineering Co. Ltd., Tokyo; Onomichi Botanic Gardens, Hiroshima; Tanaka Seed and Nursery Ltd., Osaka; Kyushu Regional Agriculture Experimental Station.
Kenya	Nairobi City Parks Department.
Malta	Argotti Botanic Gardens.
Malaya	Department of Agriculture, Kuala Lumpur; State Forest Officer, Pahang, Kuantan; Nam Kee Nursery, Singapore.
Mexico	Sen. C. Prieto, Mexico City; D. F. San Angel Inn, Col. Thacopal Mexico City.
New Guinea ...	Forest Department, Lae; Department of Agriculture, Stock and Fisheries, Port Moresby; Education Department Port Moresby; Arawa Plantation, Rabaul.
New Zealand ...	D.S.I.R., Division of Botany, Christchurch.
Nigeria	Nigerian College of Technology, Zaria.
Poland	Botanic Gardens, University of Wroclaw.
Portugal	Instituto de Botanico, Porto.
Samoa	Director of Agriculture.

Sarawak	Conservator of Forests, Kuching.
Spain	Instituto Botanico, Barcelona.
Sweden . ..	Hortus Bergianus, Stockholm.
Switzerland .	St. Gallen Botanic Gardens.
Thailand . .	Department of Agriculture, Bangkok.
Trinidad . .	Imperial College of Tropical Agriculture.
United Kingdom	Mr. V. F. Howell, Surrey; Botanic Gardens, Glasgow; Royal Botanic Garden, Edinburgh; Mr. E. Hodgkin, Bucks.; University College of North Wales.
United States of America	University of Tennessee; School of Medicine, Boston University; California Jungle Gardens; Cypress Gardens, Florida; Mr. R. L. Brovalli, California; Mr. R. B. Kurtz, New York; University of California; Makiki Nursery, Hawaii.
Union of Soviet Socialist Republic .	University of Latvia; Batum Botanic Gardens, Georgia; Biological Institute, Kannas; Excavator nijtupik, Tashkent; Hortus Pomologieus Latvia; University of Moscow.
Yugoslavia ...	Institute for Research in Plant Production, Zagreb; Botanic Gardens, Zagreb.

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